TESTS OF SIGNIFICANCE IN A 2×2 CONTINGENCY TABLE: EXTENSION OF FINNEY'S TABLE

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EDITORIAL FOREWORD

Finney (1948) has given a table which may be used to test the significance of the deviation from proportionality in any 2×2 contingency table having both the frequencies in one of its margins less than or equal to 15. The table printed below extends the range of Finney's table up to marginal frequencies of 20. As the interpretation and uses of the new table are exactly similar to those of the 1948 table, only a brief introductory statement is required.*

Using Finney's notation, the contingency table should be arranged in the form

	Number of		Total
	Successes	Failures	
Series I	a	$A-a$	A
Series II	b	$B-b$	B
	$r=a+b$	$A+B-a-b$	$A+B$

where series I is defined to be that which makes $A \geqslant B$, and the type of observation conventionally regarded as a 'success' is that which makes $a/A \geqslant b/B$. The table of significance levels is arranged in sections according to the value of A; the sections for $A = 9(1)15$ were given by Finney, while those for $A = 16(1)20$ computed by Latscha are printed below.

For given data, the table is entered in the section for A, the subsection for B and the line for a; then the main body of the table shows in bold type the appropriate significance points for b. Thus if the observed value of b is equal to or less than the bold integer in the column headed 0·05, 0·025, 0·01 or 0·005, then a/A is significantly greater than b/B (single-tail test) at these probability levels. On the other hand, for the two-tail test, if b is equal to or less than the integer in a given column, a/A is significantly *different from* b/B at a probability level equal to *twice* the figure heading that column, i.e. at the 0·10, 0·05, 0·02 and 0·01 levels, respectively. A dash, or absence of an entry, for some combination of A, B and a indicates that no 2×2 table in that class can show a significant effect at that level.

Owing to the discontinuous character of the hypergeometric distribution, the conditional probability that, for a given value of $a+b$, b will be equal to or less than the value specified in bold type will generally be less, and often very considerably less, than that shown at the head of the column; the true probabilities are given in small type.

* Copies of Finney's table are available as a *Biometrika* 'separate' and the present extension will be made available in similar form. Finney's table, but not the extension, is included in the new *Biometrika Tables for Statisticians* now at Press.

As an illustration, we may use Lange's data on criminality among twin brothers or sisters of criminals (Fisher, 1946, §21·01). This example was taken by Finney (1948), but as $A > 15$ he used it to show how his table could be extended under certain conditions. As $A \leqslant 20$, direct entry is now possible in Latscha's table.

The contingency table shows the number of twin brother or sisters of criminals who had also been convicted of crime, classing separately monozygotic and dizygotic (but like-sexed) twins:

	Not convicted	Convicted	Total
Dizygotic	15 ($= a$)	2	17 ($= A$)
Monozygotic	3 ($= b$)	10	13 ($= B$)
Total	18	12	30

Following the rule given above, the letters A, B, a and b are associated with the observed frequencies as shown. The null-hypothesis is that the twin of a criminal is no more likely to be convicted of crime if the twinning is monozygotic than if it is dizygotic. If the only deviation from the hypothesis which we are prepared to consider is that monozygotic twins behave more similarly than dizygotic, a single-tail test will be appropriate and we shall ask whether $a/A = 15/17$ is significantly greater than $b/B = 3/13$.

Turning to the appropriate section of the table with $A = 17$, $B = 13$ and $a = 15$ we find that the observed value of $b = 3$ is significant at the 0·5 % level, since it is less than 4, the last entry in the row of bold figures.

The figure in small type following $b = 4$ indicates that for a contingency table with marginal frequencies

$$A = 17, \quad B = 13, \quad r = a+b = 15+4 = 19, \quad A+B-a-b = 11,$$

the conditional probability of an arrangement within the table with $b \leqslant 4$ is 0·002 on the null hypothesis of independence. The probability that $b \leqslant 3$ within the observed table (having $a+b = 18$) is not recorded, but is $< 0{\cdot}002$.

As far as possible, checks on the internal consistency of the table have been made as well as comparisons with the more extensive tables for the special case $A = B$ published by Swaroop (1950).

REFERENCES

FINNEY, D. J. (1948). *Biometrika*, **35**, 148.
FISHER, R. A. (1946). *Statistical Methods for Research Workers*, 10th ed. Edinburgh: Oliver and Boyd.
SWAROOP, S. (1950). *Indian Med. Res. Mem.*, no. 35.

	a	Probability			
		0·05	0·025	0·01	0·005
A=16 B=16	16	**11** ·022	**11** ·022	**10** ·009	**9** ·003
	15	**10** ·041	**9** ·019	**8** ·008	**7** ·003
	14	**8** ·027	**7** ·012	**6** ·005⁻	**6** ·005⁻
	13	**7** ·033	**6** ·015⁻	**5** ·006	**4** ·002
	12	**6** ·037	**5** ·016	**4** ·006	**3** ·002
	11	**5** ·038	**4** ·016	**3** ·006	**2** ·002
	10	**4** ·037	**3** ·015⁻	**2** ·005⁻	**2** ·005⁻
	9	**3** ·033	**2** ·012	**1** ·003	**1** ·003
	8	**2** ·027	**1** ·008	**1** ·008	**0** ·001
	7	**1** ·019	**1** ·019	**0** ·003	**0** ·003
	6	**1** ·041	**0** ·009	**0** ·009	—
	5	**0** ·022	**0** ·022	—	—
15	16	**11** ·043	**10** ·018	**9** ·007	**8** ·002
	15	**9** ·033	**8** ·014	**7** ·005⁺	**6** ·002
	14	**8** ·044	**7** ·019	**6** ·008	**5** ·003
	13	**6** ·023	**6** ·023	**5** ·009	**4** ·003
	12	**5** ·024	**5** ·024	**4** ·009	**3** ·003
	11	**4** ·023	**4** ·023	**3** ·008	**2** ·002
	10	**4** ·049	**3** ·020	**2** ·006	**1** ·001
	9	**3** ·043	**2** ·016	**1** ·004	**1** ·004
	8	**2** ·035⁻	**1** ·010⁺	**0** ·002	**0** ·002
	7	**1** ·023	**1** ·023	**0** ·004	**0** ·004
	6	**0** ·011	**0** ·011	—	—
	5	**0** ·026	—	—	—
14	16	**10** ·037	**9** ·014	**8** ·005⁺	**7** ·002
	15	**8** ·025⁺	**7** ·010⁻	**7** ·010⁻	**6** ·003
	14	**7** ·032	**6** ·013	**5** ·005⁻	**5** ·005⁻
	13	**6** ·035⁺	**5** ·014	**4** ·005⁺	**3** ·001
	12	**5** ·035⁺	**4** ·014	**3** ·005⁻	**3** ·005⁻
	11	**4** ·033	**3** ·012	**2** ·004	**2** ·004
	10	**3** ·028	**2** ·009	**2** ·009	**1** ·002
	9	**2** ·021	**2** ·021	**1** ·006	**0** ·001
	8	**2** ·045⁻	**1** ·013	**0** ·002	**0** ·002
	7	**1** ·030	**0** ·006	**0** ·006	—
	6	**0** ·013	**0** ·013	—	—
	5	**0** ·031	—	—	—
13	16	**9** ·030	**8** ·011	**7** ·004	**7** ·004
	15	**8** ·047	**7** ·019	**6** ·007	**5** ·002
	14	**6** ·023	**6** ·023	**5** ·008	**4** ·003
	13	**5** ·023	**5** ·023	**4** ·008	**3** ·003
	12	**4** ·022	**4** ·022	**3** ·007	**2** ·002
	11	**4** ·048	**3** ·018	**2** ·005⁺	**1** ·001
	10	**3** ·039	**2** ·013	**1** ·003	**1** ·003
	9	**2** ·029	**1** ·008	**1** ·008	**0** ·001
	8	**1** ·018	**1** ·018	**0** ·003	**0** ·003
	7	**1** ·038	**0** ·007	**0** ·007	—
	6	**0** ·017	**0** ·017	—	—
	5	**0** ·037	—	—	—

	a	Probability			
		0·05	0·025	0·01	0·005
A=16 B=12	16	**8** ·024	**8** ·024	**7** ·008	**6** ·002
	15	**7** ·036	**6** ·013	**5** ·004	**5** ·004
	14	**6** ·040	**5** ·015⁻	**4** ·005⁻	**4** ·005⁻
	13	**5** ·039	**4** ·014	**3** ·004	**3** ·004
	12	**4** ·034	**3** ·012	**2** ·003	**2** ·003
	11	**3** ·027	**2** ·008	**2** ·008	**1** ·002
	10	**2** ·019	**2** ·019	**1** ·005⁻	**1** ·005⁻
	9	**2** ·040	**1** ·011	**0** ·002	**0** ·002
	8	**1** ·024	**1** ·024	**0** ·004	**0** ·004
	7	**1** ·048	**0** ·010⁻	**0** ·010⁻	—
	6	**0** ·021	**0** ·021	—	—
	5	**0** ·044	—	—	—
11	16	**7** ·019	**7** ·019	**6** ·006	**5** ·002
	15	**6** ·027	**5** ·009	**5** ·009	**4** ·002
	14	**5** ·027	**4** ·009	**4** ·009	**3** ·002
	13	**4** ·024	**4** ·024	**3** ·008	**2** ·002
	12	**3** ·019	**3** ·019	**2** ·005⁺	**1** ·001
	11	**3** ·041	**2** ·013	**1** ·003	**1** ·003
	10	**2** ·028	**1** ·007	**1** ·007	**0** ·001
	9	**1** ·016	**1** ·016	**0** ·002	**0** ·002
	8	**1** ·033	**0** ·006	**0** ·006	—
	7	**0** ·013	**0** ·013	—	—
	6	**0** ·027	—	—	—
10	16	**7** ·046	**6** ·014	**5** ·004	**5** ·004
	15	**5** ·018	**5** ·018	**4** ·005⁺	**3** ·001
	14	**4** ·018	**4** ·018	**3** ·005⁻	**3** ·005⁻
	13	**4** ·042	**3** ·014	**2** ·003	**2** ·003
	12	**3** ·032	**2** ·009	**2** ·009	**1** ·002
	11	**2** ·021	**2** ·021	**1** ·005⁻	**1** ·005⁻
	10	**2** ·042	**1** ·011	**0** ·002	**0** ·002
	9	**1** ·023	**1** ·023	**0** ·004	**0** ·004
	8	**1** ·045⁻	**0** ·008	**0** ·008	—
	7	**0** ·017	**0** ·017	—	—
	6	**0** ·035⁻	—	—	—
9	16	**6** ·037	**5** ·010⁻	**5** ·010⁻	**4** ·002
	15	**5** ·040	**4** ·012	**3** ·003	**3** ·003
	14	**4** ·034	**3** ·010⁻	**3** ·010⁻	**2** ·002
	13	**3** ·025⁺	**2** ·007	**2** ·007	**1** ·001
	12	**2** ·016	**2** ·016	**1** ·003	**1** ·003
	11	**2** ·033	**1** ·008	**1** ·008	**0** ·001
	10	**1** ·017	**1** ·017	**0** ·002	**0** ·002
	9	**1** ·034	**0** ·006	**0** ·006	—
	8	**0** ·012	**0** ·012	—	—
	7	**0** ·024	**0** ·024	—	—
	6	**0** ·045⁺	—	—	—

The table shows:

(1) In bold type, for given A, B and a, the value of b ($< a$) which is just significant at the probability lev quoted (single-tail test).

(2) In small type, for given A, B and $r = a + b$, the exact probability (if there is independence) that b is equal t or less than the integer shown in bold type.

Significance tests in a 2 × 2 contingency table (continued)

	a	Probability			
		0·05	0·025	0·01	0·005
A=16 B=8	16	5 ·028	4 ·007	4 ·007	3 ·001
	15	4 ·028	3 ·007	3 ·007	2 ·001
	14	3 ·021	3 ·021	2 ·005⁻	2 ·005⁻
	13	3 ·047	2 ·013	1 ·002	1 ·002
	12	2 ·028	1 ·006	1 ·006	0 ·001
	11	1 ·014	1 ·014	0 ·002	0 ·002
	10	1 ·027	0 ·004	0 ·004	0 ·004
	9	0 ·009	0 ·009	0 ·009	—
	8	0 ·017	0 ·017	—	—
	7	0 ·033	—	—	—
7	16	4 ·020	4 ·020	3 ·004	3 ·004
	15	3 ·017	3 ·017	2 ·003	2 ·003
	14	3 ·045⁺	2 ·011	1 ·002	1 ·002
	13	2 ·026	1 ·005⁻	1 ·005⁻	1 ·005⁻
	12	1 ·012	1 ·012	0 ·001	0 ·001
	11	1 ·024	1 ·024	0 ·003	0 ·003
	10	1 ·045⁻	0 ·007	0 ·007	—
	9	0 ·014	0 ·014	—	—
	8	0 ·026	—	—	—
	7	0 ·047	—	—	—
6	16	3 ·013	3 ·013	2 ·002	2 ·002
	15	3 ·046	2 ·009	2 ·009	1 ·001
	14	2 ·025⁺	1 ·004	1 ·004	1 ·004
	13	1 ·011	1 ·011	0 ·001	0 ·001
	12	1 ·023	1 ·023	0 ·003	0 ·003
	11	1 ·043	0 ·006	0 ·006	—
	10	0 ·012	0 ·012	—	—
	9	0 ·023	0 ·023	—	—
	8	0 ·040	—	—	—
5	16	3 ·048	2 ·008	2 ·008	1 ·001
	15	2 ·028	1 ·004	1 ·004	1 ·004
	14	1 ·011	1 ·011	0 ·001	0 ·001
	13	1 ·025⁺	0 ·003	0 ·003	0 ·003
	12	1 ·047	0 ·006	0 ·006	—
	11	0 ·012	0 ·012	—	—
	10	0 ·023	0 ·023	—	—
	9	0 ·039	—	—	—
4	16	2 ·032	1 ·004	1 ·004	1 ·004
	15	1 ·013	1 ·013	0 ·001	1 ·001
	14	1 ·032	0 ·003	0 ·003	0 ·003
	13	0 ·007	0 ·007	0 ·007	—
	12	0 ·014	0 ·014	—	—
	11	0 ·026	—	—	—
	10	0 ·043	—	—	—

	a	Probability			
		0·05	0·025	0·01	0·005
A=16 B=3	16	1 ·018	1 ·018	0 ·001	0 ·001
	15	0 ·004	0 ·004	0 ·004	0 ·004
	14	0 ·010⁺	0 ·010⁺	—	—
	13	0 ·021	0 ·021	—	—
	12	0 ·036	—	—	—
2	16	0 ·007	0 ·007	0 ·007	—
	15	0 ·020	0 ·020	—	—
	14	0 ·039	—	—	—
A=17 B=17	17	12 ·022	12 ·022	11 ·009	10 ·004
	16	11 ·043	10 ·020	9 ·008	8 ·003
	15	9 ·029	8 ·013	7 ·005⁺	6 ·002
	14	8 ·035⁺	7 ·016	6 ·007	5 ·002
	13	7 ·040	6 ·018	5 ·007	4 ·003
	12	6 ·042	5 ·019	4 ·007	3 ·002
	11	5 ·042	4 ·018	3 ·007	2 ·002
	10	4 ·040	3 ·016	2 ·005⁺	1 ·001
	9	3 ·035⁺	2 ·013	1 ·003	1 ·003
	8	2 ·029	1 ·008	1 ·008	0 ·001
	7	1 ·020	1 ·020	0 ·004	0 ·004
	6	1 ·043	0 ·009	0 ·009	—
	5	0 ·022	0 ·022	—	—
16	17	12 ·044	11 ·018	10 ·007	9 ·003
	16	10 ·035⁻	9 ·015⁻	8 ·006	7 ·002
	15	9 ·046	8 ·021	7 ·009	6 ·003
	14	7 ·025⁺	6 ·011	5 ·004	5 ·004
	13	6 ·027	5 ·011	4 ·004	4 ·004
	12	5 ·027	4 ·011	3 ·004	3 ·004
	11	4 ·025⁺	3 ·009	3 ·009	2 ·003
	10	3 ·022	3 ·022	2 ·007	1 ·002
	9	3 ·046	2 ·017	1 ·004	1 ·004
	8	2 ·036	1 ·011	0 ·002	0 ·002
	7	1 ·024	1 ·024	0 ·005⁻	0 ·005⁻
	6	0 ·011	0 ·011	—	—
	5	0 ·026	—	—	—
15	17	11 ·038	10 ·015⁻	9 ·006	8 ·002
	16	9 ·027	8 ·011	7 ·004	7 ·004
	15	8 ·035⁺	7 ·015⁻	6 ·006	5 ·002
	14	7 ·040	6 ·017	5 ·006	4 ·002
	13	6 ·041	5 ·017	4 ·006	3 ·002
	12	5 ·039	4 ·016	3 ·005⁺	2 ·001
	11	4 ·035⁺	3 ·013	2 ·004	2 ·004
	10	3 ·029	2 ·010⁻	2 ·010⁻	1 ·002
	9	2 ·022	2 ·022	1 ·006	0 ·001
	8	2 ·046	1 ·014	0 ·002	0 ·002
	7	1 ·030	0 ·006	0 ·006	—
	6	0 ·014	0 ·014	—	—
	5	0 ·031	—	—	—

Significance tests in a 2 × 2 contingency table (continued)

	a	Probability					a	Probability			
		0·05	0·025	0·01	0·005			0·05	0·025	0·01	0·005
A = 17 B = 14	17	**10** ·032	**9** ·012	**8** ·004	**8** ·004	A = 17 B = 11	13	**4** ·042	**3** ·014	**2** ·004	**2** ·004
	16	**8** ·021	**8** ·021	**7** ·008	**6** ·003		12	**3** ·031	**2** ·009	**2** ·009	**1** ·002
	15	**7** ·026	**6** ·010⁻	**6** ·010⁻	**5** ·003		11	**2** ·020	**2** ·020	**1** ·005⁻	**1** ·005⁻
	14	**6** ·028	**5** ·011	**4** ·004	**4** ·004		10	**2** ·040	**1** ·011	**0** ·001	**0** ·001
	13	**5** ·027	**4** ·010⁻	**4** ·010⁻	**3** ·003		9	**1** ·022	**1** ·022	**0** ·004	**0** ·004
	12	**4** ·024	**4** ·024	**3** ·008	**2** ·002		8	**1** ·042	**0** ·008	**0** ·008	—
	11	**4** ·049	**3** ·019	**2** ·006	**1** ·001		7	**0** ·016	**0** ·016	—	—
	10	**3** ·040	**2** ·014	**1** ·003	**1** ·003		6	**0** ·033	—	—	—
	9	**2** ·029	**1** ·008	**1** ·008	**0** ·001						
	8	**1** ·018	**1** ·018	**0** ·003	**0** ·003		10	17	**7** ·041	**6** ·012	**5** ·003	**5** ·003
	7	**1** ·038	**0** ·007	**0** ·007	—			16	**6** ·047	**5** ·015⁺	**4** ·004	**4** ·004
	6	**0** ·017	**0** ·017	—	—			15	**5** ·043	**4** ·014	**3** ·004	**3** ·004
	5	**0** ·036	—	—	—			14	**4** ·034	**3** ·010⁺	**2** ·002	**2** ·002
								13	**3** ·024	**3** ·024	**2** ·007	**1** ·001
	13	17	**9** ·026	**8** ·009	**8** ·009	**7** ·003		12	**3** ·049	**2** ·015⁺	**1** ·003	**1** ·003
		16	**8** ·040	**7** ·015⁺	**6** ·005⁺	**5** ·002		11	**2** ·031	**1** ·007	**1** ·007	**0** ·001
		15	**7** ·045⁺	**6** ·018	**5** ·006	**4** ·002		10	**1** ·016	**1** ·016	**0** ·002	**0** ·002
		14	**6** ·045⁺	**5** ·018	**4** ·006	**3** ·002		9	**1** ·031	**0** ·005⁺	**0** ·005⁺	—
		13	**5** ·042	**4** ·016	**3** ·005⁺	**2** ·001		8	**0** ·011	**0** ·011	—	—
		12	**4** ·035⁺	**3** ·013	**2** ·004	**2** ·004		7	**0** ·022	**0** ·022	—	—
		11	**3** ·028	**2** ·009	**2** ·009	**1** ·002		6	**0** ·042	—	—	—
		10	**2** ·019	**2** ·019	**1** ·005⁻	**1** ·005⁻						
		9	**2** ·040	**1** ·011	**0** ·002	**0** ·002		9	17	**6** ·032	**5** ·008	**5** ·008	**4** ·002
		8	**1** ·024	**1** ·024	**0** ·004	**0** ·004			16	**5** ·034	**4** ·010⁻	**4** ·010⁻	**3** ·002
		7	**1** ·047	**0** ·010⁻	**0** ·010⁻	—			15	**4** ·028	**3** ·008	**3** ·008	**2** ·002
		6	**0** ·021	**0** ·021	—	—			14	**3** ·020	**3** ·020	**2** ·005⁻	**2** ·005⁻
		5	**0** ·043	—	—	—			13	**3** ·042	**2** ·012	**1** ·002	**1** ·002
									12	**2** ·025⁺	**1** ·006	**1** ·006	**0** ·001
	12	17	**8** ·021	**8** ·021	**7** ·007	**6** ·002			11	**2** ·048	**1** ·012	**0** ·002	**0** ·002
		16	**7** ·030	**6** ·011	**5** ·003	**5** ·003			10	**1** ·024	**1** ·024	**0** ·004	**0** ·004
		15	**6** ·033	**5** ·012	**4** ·004	**4** ·004			9	**1** ·045⁻	**0** ·008	**0** ·008	—
		14	**5** ·030	**4** ·011	**3** ·003	**3** ·003			8	**0** ·016	**0** ·016	—	—
		13	**4** ·026	**3** ·008	**3** ·008	**2** ·002			7	**0** ·030	—	—	—
		12	**3** ·020	**3** ·020	**2** ·006	**1** ·001							
		11	**3** ·041	**2** ·013	**1** ·003	**1** ·003		8	17	**5** ·024	**5** ·024	**4** ·006	**3** ·001
		10	**2** ·028	**1** ·007	**1** ·007	**0** ·001			16	**4** ·023	**4** ·023	**3** ·006	**2** ·001
		9	**1** ·016	**1** ·016	**0** ·002	**0** ·002			15	**3** ·017	**3** ·017	**2** ·004	**2** ·004
		8	**1** ·032	**0** ·006	**0** ·006	—			14	**3** ·039	**2** ·010⁻	**2** ·010⁻	**1** ·002
		7	**0** ·012	**0** ·012	—	—			13	**2** ·022	**2** ·022	**1** ·004	**1** ·004
		6	**0** ·026	—	—	—			12	**2** ·043	**1** ·010⁻	**1** ·010⁻	**0** ·001
									11	**1** ·020	**1** ·020	**0** ·003	**0** ·003
	11	17	**7** ·016	**7** ·016	**6** ·005⁻	**6** ·005⁻			10	**1** ·038	**0** ·006	**0** ·006	—
		16	**6** ·022	**6** ·022	**5** ·007	**4** ·002			9	**0** ·012	**0** ·012	—	—
		15	**5** ·022	**5** ·022	**4** ·007	**3** ·002			8	**0** ·022	**0** ·022	—	—
		14	**4** ·019	**4** ·019	**3** ·006	**2** ·001			7	**0** ·040	—	—	—

The table shows:

(1) In bold type, for given A, B and a, the value of b ($<a$) which is just significant at the probability level quoted (single-tail test).

(2) In small type, for given A, B and $r = a + b$, the exact probability (if there is independence) that b is equal to or less than the integer shown in bold type.

Significance tests in a 2 × 2 contingency table (continued)

	a	Probability			
		0·05	0·025	0·01	0·005
A=17 B=7	17	4 ·017	4 ·017	3 ·003	3 ·003
	16	3 ·014	3 ·014	2 ·003	2 ·003
	15	3 ·038	2 ·009	2 ·009	1 ·001
	14	2 ·021	2 ·021	1 ·004	1 ·004
	13	2 ·042	1 ·009	1 ·009	0 ·001
	12	1 ·018	1 ·018	0 ·002	0 ·002
	11	1 ·034	0 ·005⁻	0 ·005⁻	0 ·005⁻
	10	0 ·010⁻	0 ·010⁻	0 ·010⁻	—
	9	0 ·019	0 ·019	—	—
	8	0 ·033	—	—	—
6	17	3 ·011	3 ·011	2 ·002	2 ·002
	16	3 ·040	2 ·008	2 ·008	1 ·001
	15	2 ·021	2 ·021	1 ·003	1 ·003
	14	2 ·045⁺	1 ·009	1 ·009	0 ·001
	13	1 ·018	1 ·018	0 ·002	0 ·002
	12	1 ·035⁻	0 ·005⁻	0 ·005⁻	0 ·005⁻
	11	0 ·009	0 ·009	0 ·009	—
	10	0 ·017	0 ·017	—	—
	9	0 ·030	—	—	—
	8	0 ·050⁻	—	—	—
5	17	3 ·043	2 ·006	2 ·006	1 ·001
	16	2 ·024	2 ·024	1 ·003	1 ·003
	15	1 ·009	1 ·009	1 ·009	0 ·001
	14	1 ·021	1 ·021	0 ·002	0 ·002
	13	1 ·039	0 ·005⁻	0 ·005⁻	0 ·005⁻
	12	0 ·010⁻	0 ·010⁻	0 ·010⁻	—
	11	0 ·018	0 ·018	—	—
	10	0 ·030	—	—	—
	9	0 ·049	—	—	—
4	17	2 ·029	1 ·003	1 ·003	1 ·003
	16	1 ·011	1 ·011	0 ·001	0 ·001
	15	1 ·028	0 ·003	0 ·003	0 ·003
	14	0 ·006	0 ·006	0 ·006	—
	13	0 ·012	0 ·012	—	—
	12	0 ·021	0 ·021	—	—
	11	0 ·035⁺	—	—	—
3	17	1 ·016	1 ·016	0 ·001	0 ·001
	16	1 ·046	0 ·004	0 ·004	0 ·004
	15	0 ·009	0 ·009	0 ·009	—
	14	0 ·018	0 ·018	—	—
	13	0 ·031	—	—	—
	12	0 ·049	—	—	—
2	17	0 ·006	0 ·006	0 ·006	—
	16	0 ·018	0 ·018	—	—
	15	0 ·035⁺	—	—	—

	a	Probability			
		0·05	0·025	0·01	0·005
A=18 B=18	18	13 ·023	13 ·023	12 ·010⁻	11 ·004
	17	12 ·044	11 ·020	10 ·009	9 ·004
	16	10 ·030	9 ·014	8 ·006	7 ·002
	15	9 ·038	8 ·018	7 ·008	6 ·003
	14	8 ·043	7 ·020	6 ·009	5 ·003
	13	7 ·046	6 ·022	5 ·009	4 ·003
	12	6 ·047	5 ·022	4 ·009	3 ·003
	11	5 ·046	4 ·020	3 ·008	2 ·002
	10	4 ·043	3 ·018	2 ·006	1 ·001
	9	3 ·038	2 ·014	1 ·004	1 ·004
	8	2 ·030	1 ·009	1 ·009	0 ·001
	7	1 ·020	1 ·020	0 ·004	0 ·004
	6	1 ·044	0 ·010⁻	0 ·010⁻	—
	5	0 ·023	0 ·023	—	—
17	18	13 ·045⁺	12 ·019	11 ·008	10 ·003
	17	11 ·036	10 ·016	9 ·007	8 ·002
	16	10 ·049	9 ·023	8 ·010⁻	7 ·004
	15	8 ·028	7 ·012	6 ·005⁻	6 ·005⁻
	14	7 ·030	6 ·013	5 ·005⁺	4 ·002
	13	6 ·031	5 ·013	4 ·005⁻	4 ·005⁻
	12	5 ·030	4 ·012	3 ·004	3 ·004
	11	4 ·028	3 ·010⁺	2 ·003	2 ·003
	10	3 ·023	3 ·023	2 ·008	1 ·002
	9	3 ·047	2 ·018	1 ·005⁻	1 ·005⁻
	8	2 ·037	1 ·011	0 ·002	0 ·002
	7	1 ·025⁻	1 ·025⁻	0 ·005⁻	0 ·005⁻
	6	0 ·011	0 ·011	—	—
	5	0 ·026	—	—	—
16	18	12 ·039	11 ·016	10 ·006	9 ·002
	17	10 ·029	9 ·012	8 ·005⁻	8 ·005⁻
	16	9 ·038	8 ·017	7 ·007	6 ·002
	15	8 ·043	7 ·019	6 ·008	5 ·003
	14	7 ·046	6 ·020	5 ·008	4 ·003
	13	6 ·045⁺	5 ·020	4 ·007	3 ·002
	12	5 ·042	4 ·018	3 ·006	2 ·002
	11	4 ·037	3 ·015⁻	2 ·004	2 ·004
	10	3 ·031	2 ·011	1 ·003	1 ·003
	9	2 ·023	2 ·023	1 ·006	0 ·001
	8	2 ·046	1 ·014	0 ·002	0 ·002
	7	1 ·030	0 ·006	0 ·006	—
	6	0 ·014	0 ·014	—	—
	5	0 ·031	—	—	—
15	18	11 ·033	10 ·013	9 ·005⁻	9 ·005⁻
	17	9 ·023	9 ·023	8 ·009	7 ·003
	16	8 ·029	7 ·012	6 ·004	6 ·004
	15	7 ·031	6 ·013	5 ·005⁻	5 ·005⁻
	14	6 ·031	5 ·013	4 ·004	4 ·004
	13	5 ·029	4 ·011	3 ·004	3 ·004

Significance tests in a 2 × 2 contingency table (continued)

	a	Probability					a	Probability			
		0·05	0·025	0·01	0·005			0·05	0·025	0·01	0·005
A = 18 B = 15	12	**4** ·025+	**3** ·009	**3** ·009	**2** ·003	A = 18 B = 12	10	**2** ·038	**1** ·010+	**0** ·001	**0** ·001
	11	**3** ·020	**3** ·020	**2** ·006	**1** ·001		9	**1** ·021	**1** ·021	**0** ·003	**0** ·003
	10	**3** ·041	**2** ·014	**1** ·004	**1** ·004		8	**1** ·040	**0** ·007	**0** ·007	—
	9	**2** ·030	**1** ·008	**1** ·008	**0** ·001		7	**0** ·016	**0** ·016	—	—
	8	**1** ·018	**1** ·018	**0** ·003	**0** ·003		6	**0** ·031	—	—	—
	7	**1** ·038	**0** ·007	**0** ·007	—						
	6	**0** ·017	**0** ·017	—	—	11	18	**8** ·045+	**7** ·014	**6** ·004	**6** ·004
	5	**0** ·036	—	—	—		17	**6** ·018	**6** ·018	**5** ·006	**4** ·001
							16	**5** ·018	**5** ·018	**4** ·005+	**3** ·001
14	18	**10** ·028	**9** ·010−	**9** ·010−	**8** ·003		15	**5** ·043	**4** ·015−	**3** ·004	**3** ·004
	17	**9** ·043	**8** ·017	**7** ·006	**6** ·002		14	**4** ·033	**3** ·011	**2** ·003	**2** ·003
	16	**8** ·050−	**7** ·021	**6** ·008	**5** ·003		13	**3** ·023	**3** ·023	**2** ·007	**1** ·001
	15	**6** ·022	**6** ·022	**5** ·008	**4** ·003		12	**3** ·046	**2** ·014	**1** ·003	**1** ·003
	14	**6** ·049	**5** ·020	**4** ·007	**3** ·002		11	**2** ·029	**1** ·007	**1** ·007	**0** ·001
	13	**5** ·044	**4** ·017	**3** ·006	**2** ·001		10	**1** ·015−	**1** ·015−	**0** ·002	**0** ·002
	12	**4** ·037	**3** ·013	**2** ·004	**2** ·004		9	**1** ·029	**0** ·005−	**0** ·005−	**0** ·005−
	11	**3** ·028	**2** ·009	**2** ·009	**1** ·002		8	**0** ·010+	**0** ·010+	—	—
	10	**2** ·020	**2** ·020	**1** ·005−	**1** ·005−		7	**0** ·020	**0** ·020	—	—
	9	**2** ·039	**1** ·011	**0** ·002	**0** ·002		6	**0** ·039	—	—	—
	8	**1** ·024	**1** ·024	**0** ·004	**0** ·004						
	7	**1** ·047	**0** ·009	**0** ·009	—	10	18	**7** ·037	**6** ·010+	**5** ·003	**5** ·003
	6	**0** ·020	**0** ·020	—	—		17	**6** ·041	**5** ·013	**4** ·003	**4** ·003
	5	**0** ·043	—	—	—		16	**5** ·036	**4** ·011	**3** ·003	**3** ·003
							15	**4** ·028	**3** ·008	**3** ·008	**2** ·002
13	18	**9** ·023	**9** ·023	**8** ·008	**7** ·002		14	**3** ·019	**3** ·019	**2** ·005−	**2** ·005−
	17	**8** ·034	**7** ·012	**6** ·004	**6** ·004		13	**3** ·039	**2** ·011	**1** ·002	**1** ·002
	16	**7** ·037	**6** ·014	**5** ·005−	**5** ·005−		12	**2** ·023	**2** ·023	**1** ·005+	**0** ·001
	15	**6** ·036	**5** ·014	**4** ·004	**4** ·004		11	**2** ·043	**1** ·011	**0** ·001	**0** ·001
	14	**5** ·032	**4** ·012	**3** ·004	**3** ·004		10	**1** ·022	**1** ·022	**0** ·003	**0** ·003
	13	**4** ·027	**3** ·009	**3** ·009	**2** ·002		9	**1** ·040	**0** ·007	**0** ·007	—
	12	**3** ·020	**3** ·020	**2** ·006	**1** ·001		8	**0** ·014	**0** ·014	—	—
	11	**3** ·040	**2** ·013	**1** ·003	**1** ·003		7	**0** ·027	—	—	—
	10	**2** ·027	**1** ·007	**1** ·007	**0** ·001		6	**0** ·049	—	—	—
	9	**1** ·015+	**1** ·015+	**0** ·002	**0** ·002						
	8	**1** ·031	**0** ·006	**0** ·006	—	9	18	**6** ·029	**5** ·007	**5** ·007	**4** ·002
	7	**0** ·012	**0** ·012	—	—		17	**5** ·030	**4** ·008	**4** ·008	**3** ·002
	6	**0** ·025+	—	—	—		16	**4** 023	**4** ·023	**3** ·006	**2** ·001
							15	**3** ·016	**3** ·016	**2** ·004	**2** ·004
12	18	**8** ·018	**8** ·018	**7** ·006	**6** ·002		14	**3** ·034	**2** ·009	**2** ·009	**1** ·002
	17	**7** ·026	**6** ·009	**6** ·009	**5** ·003		13	**2** ·019	**2** ·019	**1** ·004	**1** ·004
	16	**6** ·027	**5** ·009	**5** ·009	**4** ·003		12	**2** ·037	**1** ·009	**1** ·009	**0** ·001
	15	**5** ·024	**5** ·024	**4** ·008	**3** ·002		11	**1** ·018	**1** ·018	**0** ·002	**0** ·002
	14	**4** ·020	**4** ·020	**3** ·006	**2** ·001		10	**1** ·033	**0** ·005+	**0** ·005+	—
	13	**4** ·042	**3** ·014	**2** ·004	**2** ·004		9	**0** ·010+	**0** ·010+	—	—
	12	**3** ·030	**2** ·009	**2** ·009	**1** ·002		8	**0** ·020	**0** ·020	—	—
	11	**2** ·019	**2** ·019	**1** ·005−	**1** ·005−		7	**0** ·036	—	—	—

The table shows:

(1) In bold type, for given A, B and a, the value of b ($<a$) which is just significant at the probability level quoted (single-tail test).

(2) In small type, for given A, B and $r = a + b$, the exact probability (if there is independence) that b is equal to or less than the integer shown in bold type.

Significance tests in a 2 × 2 contingency table (continued)

	a	Probability			
		0·05	0·025	0·01	0·005
A=18 B=8	18	5 ·022	5 ·022	4 ·005⁻	4 ·005⁻
	17	4 ·020	4 ·020	3 ·004	3 ·004
	16	3 ·014	3 ·014	2 ·003	2 ·003
	15	3 ·032	2 ·008	2 ·008	1 ·001
	14	2 ·017	2 ·017	1 ·003	1 ·003
	13	2 ·034	1 ·007	1 ·007	0 ·001
	12	1 ·015⁺	1 ·015⁺	0 ·002	0 ·002
	11	1 ·028	0 ·004	0 ·004	0 ·004
	10	1 ·049	0 ·008	0 ·008	—
	9	0 ·016	0 ·016	—	—
	8	0 ·028	—	—	—
	7	0 ·048	—	—	—
7	18	4 ·015⁺	4 ·015⁺	3 ·003	3 ·003
	17	3 ·012	3 ·012	2 ·002	2 ·002
	16	3 ·032	2 ·007	2 ·007	1 ·001
	15	2 ·017	2 ·017	1 ·003	1 ·003
	14	2 ·034	1 ·007	1 ·007	0 ·001
	13	1 ·014	1 ·014	0 ·002	0 ·002
	12	1 ·027	0 ·004	0 ·004	0 ·004
	11	1 ·046	0 ·007	0 ·007	—
	10	0 ·013	0 ·013	—	—
	9	0 ·024	0 ·024	—	—
	8	0 ·040	—	—	—
6	18	3 ·010⁻	3 ·010⁻	3 ·010⁻	2 ·001
	17	3 ·035⁺	2 ·006	2 ·006	1 ·001
	16	2 ·018	2 ·018	1 ·003	1 ·003
	15	2 ·038	1 ·007	1 ·007	0 ·001
	14	1 ·015⁻	1 ·015⁻	0 ·002	0 ·002
	13	1 ·028	0 ·003	0 ·003	0 ·003
	12	1 ·048	0 ·007	0 ·007	—
	11	0 ·013	0 ·013	—	—
	10	0 ·022	0 ·022	—	—
	9	0 ·037	—	—	—
5	18	3 ·040	2 ·006	2 ·006	1 ·001
	17	2 ·021	2 ·021	1 ·003	1 ·003
	16	2 ·048	1 ·008	1 ·008	0 ·001
	15	1 ·017	1 ·017	0 ·002	0 ·002
	14	1 ·033	0 ·004	0 ·004	0 ·004
	13	0 ·007	0 ·007	0 ·007	—
	12	0 ·014	0 ·014	—	—
	11	0 ·024	0 ·024	—	—
	10	0 ·038	—	—	—
4	18	2 ·026	1 ·003	1 ·003	1 ·003
	17	1 ·010⁻	1 ·010⁻	1 ·010⁻	0 ·001
	16	1 ·024	1 ·024	0 ·002	0 ·002
	15	1 ·046	0 ·005⁻	0 ·005⁻	0 ·005⁻
	14	0 ·010⁻	0 ·010⁻	0 ·010⁻	—

	a	Probability			
		0·05	0·025	0·01	0·005
A=18 B=4	13	0 ·017	0 ·017	—	—
	12	0 ·029	—	—	—
	11	0 ·045⁺	—	—	—
3	18	1 ·014	1 ·014	0 ·001	0 ·001
	17	1 ·041	0 ·003	0 ·003	0 ·003
	16	0 ·008	0 ·008	0 ·008	—
	15	0 ·015⁺	0 ·015⁺	—	—
	14	0 ·026	—	—	—
	13	0 ·042	—	—	—
2	18	0 ·005⁺	0 ·005⁺	0 ·005⁺	—
	17	0 ·016	0 ·016	—	—
	16	0 ·032	—	—	—
A=19 B=19	19	14 ·023	14 ·023	13 ·010⁻	12 ·004
	18	13 ·045⁻	12 ·021	11 ·009	10 ·004
	17	11 ·031	10 ·015⁻	9 ·006	8 ·003
	16	10 ·039	9 ·019	8 ·009	7 ·003
	15	9 ·046	8 ·022	6 ·004	6 ·004
	14	8 ·050⁻	7 ·024	5 ·004	5 ·004
	13	6 ·025⁺	5 ·011	4 ·004	4 ·004
	12	5 ·024	5 ·024	3 ·003	3 ·003
	11	5 ·050⁻	4 ·022	3 ·009	2 ·003
	10	4 ·046	3 ·019	2 ·006	1 ·002
	9	3 ·039	2 ·015⁻	1 ·004	1 ·004
	8	2 ·031	1 ·009	1 ·009	0 ·002
	7	1 ·021	1 ·021	0 ·004	0 ·004
	6	1 ·045⁻	0 ·010⁻	0 ·010⁻	—
	5	0 ·023	0 ·023	—	—
18	19	14 ·046	13 ·020	12 ·008	11 ·003
	18	12 ·037	11 ·017	10 ·007	9 ·003
	17	10 ·024	10 ·024	8 ·004	8 ·004
	16	9 ·030	8 ·014	7 ·006	6 ·002
	15	8 ·033	7 ·015⁺	6 ·006	5 ·002
	14	7 ·035⁺	6 ·016	5 ·006	4 ·002
	13	6 ·035⁻	5 ·015⁺	4 ·006	3 ·002
	12	5 ·033	4 ·014	3 ·005⁻	3 ·005⁻
	11	4 ·030	3 ·011	2 ·004	2 ·004
	10	3 ·025⁻	3 ·025⁻	2 ·008	1 ·002
	9	3 ·049	2 ·019	1 ·005⁺	0 ·001
	8	2 ·038	1 ·012	0 ·002	0 ·002
	7	1 ·025⁺	0 ·005⁻	0 ·005⁻	0 ·005⁻
	6	0 ·012	0 ·012	—	—
	5	0 ·027	—	—	—
17	19	13 ·040	12 ·016	11 ·006	10 ·002
	18	11 ·030	10 ·013	9 ·005⁺	8 ·002
	17	10 ·040	9 ·018	8 ·008	7 ·003
	16	9 ·047	8 ·022	7 ·009	6 ·003

Significance tests in a 2 × 2 contingency table (continued)

	a	Probability					a	Probability			
		0·05	0·025	0·01	0·005			0·05	0·025	0·01	0·005
A = 19 B = 17	15	**8** ·050⁻	**7** ·023	**6** ·010⁻	**5** ·004	A = 19 B = 14	16	**7** ·042	**6** ·017	**5** ·006	**4** ·002
	14	**6** ·023	**6** ·023	**5** ·010⁻	**4** ·003		15	**6** ·039	**5** ·015⁺	**4** ·005⁺	**3** ·001
	13	**6** ·049	**5** ·022	**4** ·008	**3** ·003		14	**5** ·034	**4** ·013	**3** ·004	**3** ·004
	12	**5** ·045⁻	**4** ·019	**3** ·007	**2** ·002		13	**4** ·027	**3** ·009	**3** ·009	**2** ·003
	11	**4** ·039	**3** ·015⁺	**2** ·005⁻	**2** ·005⁻		12	**3** ·020	**3** ·020	**2** ·006	**1** ·001
	10	**3** ·032	**2** ·011	**1** ·003	**1** ·003		11	**3** ·040	**2** ·013	**1** ·003	**1** ·003
	9	**2** ·024	**2** ·024	**1** ·007	**0** ·001		10	**2** ·027	**1** ·007	**1** ·007	**0** ·001
	8	**2** ·047	**1** ·015⁻	**0** ·002	**0** ·002		9	**1** ·015⁻	**1** ·015⁻	**0** ·002	**0** ·002
	7	**1** ·031	**0** ·006	**0** ·006	—		8	**1** ·030	**0** ·005⁺	**0** ·005⁺	—
	6	**0** ·014	**0** ·014	—	—		7	**0** ·012	**0** ·012	—	—
	5	**0** ·031	—	—	—		6	**0** ·024	**0** ·024	—	—
							5	**0** ·049	—	—	—
16	19	**12** ·035⁻	**11** ·013	**10** ·005⁻	**10** ·005⁻						
	18	**10** ·024	**10** ·024	**9** ·010⁻	**8** ·004	13	19	**9** ·020	**9** ·020	**8** ·006	**7** ·002
	17	**9** ·031	**8** ·013	**7** ·005⁺	**6** ·002		18	**8** ·029	**7** ·010⁺	**6** ·003	**6** ·003
	16	**8** ·035⁻	**7** ·015⁺	**6** ·006	**5** ·002		17	**7** ·031	**6** ·011	**5** ·004	**5** ·004
	15	**7** ·036	**6** ·015⁺	**5** ·006	**4** ·002		16	**6** ·029	**5** ·011	**4** ·003	**4** ·003
	14	**6** ·034	**5** ·014	**4** ·005⁺	**3** ·002		15	**5** ·025⁺	**4** ·009	**4** ·009	**3** ·003
	13	**5** ·031	**4** ·013	**3** ·004	**3** ·004		14	**4** ·020	**4** ·020	**3** ·006	**2** ·002
	12	**4** ·027	**3** ·010⁻	**3** ·010⁻	**2** ·003		13	**4** ·041	**3** ·015⁻	**2** ·004	**2** ·004
	11	**3** ·021	**3** ·021	**2** ·007	**1** ·002		12	**3** ·029	**2** ·009	**2** ·009	**1** ·002
	10	**3** ·042	**2** ·015⁻	**1** ·004	**1** ·004		11	**2** ·019	**2** ·019	**1** ·005⁻	**1** ·005⁻
	9	**2** ·030	**1** ·009	**1** ·009	**0** ·001		10	**2** ·036	**1** ·010⁻	**1** ·010⁻	**0** ·001
	8	**1** ·018	**1** ·018	**0** ·003	**0** ·003		9	**1** ·020	**1** ·020	**0** ·003	**0** ·003
	7	**1** ·037	**0** ·007	**0** ·007	—		8	**1** ·038	**0** ·007	**0** ·007	—
	6	**0** ·017	**0** ·017	—	—		7	**0** ·015⁻	**0** ·015⁻	—	—
	5	**0** ·036	—	—	—		6	**0** ·030	—	—	—
15	19	**11** ·029	**10** ·011	**9** ·004	**9** ·004	12	19	**9** ·049	**8** ·016	**7** ·005⁻	**7** ·005⁻
	18	**10** ·046	**9** ·019	**8** ·007	**7** ·002		18	**7** ·022	**7** ·022	**6** ·007	**5** ·002
	17	**8** ·023	**8** ·023	**7** ·009	**6** ·003		17	**6** ·022	**6** ·022	**5** ·007	**4** ·002
	16	**7** ·025⁻	**7** ·025⁻	**6** ·010⁻	**5** ·003		16	**5** ·019	**5** ·019	**4** ·006	**3** ·002
	15	**6** ·024	**6** ·024	**5** ·009	**4** ·003		15	**5** ·042	**4** ·015⁺	**3** ·004	**3** ·004
	14	**5** ·022	**5** ·022	**4** ·008	**3** ·002		14	**4** ·032	**3** ·011	**2** ·003	**2** ·003
	13	**5** ·045⁺	**4** ·018	**3** ·006	**2** ·002		13	**3** ·023	**3** ·023	**2** ·006	**1** ·001
	12	**4** ·037	**3** ·014	**2** ·004	**2** ·004		12	**3** ·043	**2** ·014	**1** ·003	**1** ·003
	11	**3** ·029	**2** ·009	**2** ·009	**1** ·002		11	**2** ·027	**1** ·007	**1** ·007	**0** ·001
	10	**2** ·020	**2** ·020	**1** ·005⁺	**0** ·001		10	**2** ·050⁻	**1** ·014	**0** ·002	**0** ·002
	9	**2** ·039	**1** ·011	**0** ·002	**0** ·002		9	**1** ·027	**0** ·005⁻	**0** ·005⁻	**0** ·005⁻
	8	**1** ·023	**1** ·023	**0** ·004	**0** ·004		8	**1** ·050⁻	**0** ·010⁻	**0** ·010⁻	—
	7	**1** ·046	**0** ·009	**0** ·009	—		7	**0** ·019	**0** ·019	—	—
	6	**0** ·020	**0** ·020	—	—		6	**0** ·037	—	—	—
	5	**0** ·042	—	—	—						
						11	19	**8** ·041	**7** ·012	**6** ·003	**6** ·003
14	19	**10** ·024	**10** ·024	**9** ·008	**8** ·003		18	**7** ·047	**6** ·016	**5** ·004	**5** ·004
	18	**9** ·037	**8** ·014	**7** ·005⁻	**7** ·005⁻		17	**6** ·043	**5** ·015⁻	**4** ·004	**4** ·004
	17	**8** ·042	**7** ·017	**6** ·006	**5** ·002		16	**5** ·035⁺	**4** ·012	**3** ·003	**3** ·003

The table shows:

(1) In bold type, for given A, B and a, the value of b ($<a$) which is just significant at the probability level quoted (single-tail test).

(2) In small type, for given A, B and $r = a + b$, the exact probability (if there is independence) that b is equal to or less than the integer shown in bold type.

Significance tests in a 2 × 2 contingency table (continued)

	a	Probability			
		0·05	0·025	0·01	0·005
A = 19 B = 11	15	4 ·027	3 ·008	3 ·008	2 ·002
	14	3 ·018	3 ·018	2 ·005⁻	2 ·005⁻
	13	3 ·035⁺	2 ·010⁺	1 ·002	1 ·002
	12	2 ·021	2 ·021	1 ·005⁻	1 ·005⁻
	11	2 ·040	1 ·010⁺	0 ·001	0 ·001
	10	1 ·020	1 ·020	0 ·003	0 ·003
	9	1 ·037	0 ·006	0 ·006	—
	8	0 ·013	0 ·013	—	—
	7	0 ·025⁻	0 ·025⁻	—	—
	6	0 ·046	—	—	—
10	19	7 ·033	6 ·009	6 ·009	5 ·002
	18	6 ·036	5 ·011	4 ·003	4 ·003
	17	5 ·030	4 ·009	4 ·009	3 ·002
	16	4 ·022	4 ·022	3 ·006	2 ·001
	15	4 ·047	3 ·015⁻	2 ·004	2 ·004
	14	3 ·030	2 ·008	2 ·008	1 ·002
	13	2 ·017	2 ·017	1 ·004	1 ·004
	12	2 ·033	1 ·008	1 ·008	0 ·001
	11	1 ·016	1 ·016	0 ·002	0 ·002
	10	1 ·029	0 ·005⁻	0 ·005⁻	0 ·005⁻
	9	0 ·009	0 ·009	0 ·009	—
	8	0 ·018	0 ·018	—	—
	7	0 ·032	—	—	—
9	19	6 ·026	5 ·006	5 ·006	4 ·001
	18	5 ·026	4 ·007	4 ·007	3 ·001
	17	4 ·020	4 ·020	3 ·005⁻	3 ·005⁻
	16	4 ·044	3 ·013	2 ·003	2 ·003
	15	3 ·028	2 ·007	2 ·007	1 ·001
	14	2 ·015⁻	2 ·015⁻	1 ·003	1 ·003
	13	2 ·029	1 ·006	1 ·006	0 ·001
	12	1 ·013	1 ·013	0 ·002	0 ·002
	11	1 ·024	1 ·024	0 ·004	0 ·004
	10	1 ·042	0 ·007	0 ·007	—
	9	0 ·013	0 ·013	—	—
	8	0 ·024	0 ·024	—	—
	7	0 ·043	—	—	—
8	19	5 ·019	5 ·019	4 ·004	4 ·004
	18	4 ·017	4 ·017	3 ·004	3 ·004
	17	4 ·044	3 ·011	2 ·002	2 ·002
	16	3 ·027	2 ·006	2 ·006	1 ·001
	15	2 ·013	2 ·013	1 ·002	1 ·002
	14	2 ·027	1 ·006	1 ·006	0 ·001
	13	2 ·049	1 ·011	0 ·001	0 ·001
	12	1 ·021	1 ·021	0 ·003	0 ·003
	11	1 ·038	0 ·006	0 ·006	—
	10	0 ·011	0 ·011	—	—
	9	0 ·020	0 ·020	—	—
	8	0 ·034	—	—	—

	a	Probability			
		0·05	0·025	0·01	0·005
A = 19 B = 7	19	4 ·013	4 ·013	3 ·002	3 ·002
	18	4 ·047	3 ·010⁺	2 ·002	2 ·002
	17	3 ·028	2 ·006	2 ·006	1 ·001
	16	2 ·014	2 ·014	1 ·002	1 ·002
	15	2 ·028	1 ·005⁺	1 ·005⁺	0 ·001
	14	1 ·011	1 ·011	0 ·001	0 ·001
	13	1 ·021	1 ·021	0 ·003	0 ·003
	12	1 ·037	0 ·005⁺	0 ·005⁺	—
	11	0 ·010⁻	0 ·010⁻	0 ·010⁻	—
	10	0 ·017	0 ·017	—	—
	9	0 ·030	—	—	—
	8	0 ·048	—	—	—
6	19	4 ·050⁻	3 ·009	3 ·009	2 ·001
	18	3 ·031	2 ·005⁺	2 ·005⁺	1 ·001
	17	2 ·015⁺	2 ·015⁺	1 ·002	1 ·002
	16	2 ·032	1 ·006	1 ·006	0 ·000
	15	1 ·012	1 ·012	0 ·001	0 ·001
	14	1 ·023	1 ·023	0 ·003	0 ·003
	13	1 ·039	0 ·005⁺	0 ·005⁺	—
	12	0 ·010⁻	0 ·010⁻	0 ·010⁻	—
	11	0 ·017	0 ·017	—	—
	10	0 ·028	—	—	—
	9	0 ·045⁺	—	—	—
5	19	3 ·036	2 ·005⁻	2 ·005⁻	2 ·005⁻
	18	2 ·018	2 ·018	1 ·002	1 ·002
	17	2 ·042	1 ·006	1 ·006	0 ·000
	16	1 ·014	1 ·014	0 ·001	0 ·001
	15	1 ·028	0 ·003	0 ·003	0 ·003
	14	1 ·047	0 ·006	0 ·006	—
	13	0 ·011	0 ·011	—	—
	12	0 ·019	0 ·019	—	—
	11	0 ·030	—	—	—
	10	0 ·047	—	—	—
4	19	2 ·024	2 ·024	1 ·002	1 ·002
	18	1 ·009	1 ·009	1 ·009	0 ·001
	17	1 ·021	1 ·021	0 ·002	0 ·002
	16	1 ·040	0 ·004	0 ·004	0 ·004
	15	0 ·008	0 ·008	0 ·008	—
	14	0 ·014	0 ·014	—	—
	13	0 ·024	0 ·024	—	—
	12	0 ·037	—	—	—
3	19	1 ·013	1 ·013	0 ·001	0 ·001
	18	1 ·038	0 ·003	0 ·003	0 ·003
	17	0 ·006	0 ·006	0 ·006	—
	16	0 ·013	0 ·013	—	—
	15	0 ·023	0 ·023	—	—
	14	0 ·036	—	—	—

Significance tests in a 2 × 2 contingency table (continued)

	a	Probability			
		0·05	0·025	0·01	0·005
A = 19 B = 2	19	**0** ·005⁻	**0** ·005⁻	**0** ·005⁻	**0** ·005⁻
	18	**0** ·014	**0** ·014	—	—
	17	**0** ·029	—	—	—
	16	**0** ·048	—	—	—
A = 20 B = 20	20	**15** ·024	**15** ·024	**13** ·004	**13** ·004
	19	**14** ·046	**13** ·022	**12** ·010⁻	**11** ·004
	18	**12** ·032	**11** ·015⁺	**10** ·007	**9** ·003
	17	**11** ·041	**10** ·020	**9** ·009	**8** ·004
	16	**10** ·048	**9** ·024	**7** ·005⁻	**7** ·005⁻
	15	**8** ·027	**7** ·012	**6** ·005⁺	**5** ·002
	14	**7** ·028	**6** ·013	**5** ·005⁺	**4** ·002
	13	**6** ·028	**5** ·012	**4** ·005⁻	**4** ·005⁻
	12	**5** ·027	**4** ·011	**3** ·004	**3** ·004
	11	**4** ·024	**4** ·024	**3** ·009	**2** ·003
	10	**4** ·048	**3** ·020	**2** ·007	**1** ·002
	9	**3** ·041	**2** ·015⁺	**1** ·004	**1** ·004
	8	**2** ·032	**1** ·010⁻	**1** ·010⁻	**0** ·002
	7	**1** ·022	**1** ·022	**0** ·004	**0** ·004
	6	**1** ·046	**0** ·010⁺	—	—
	5	**0** ·024	**0** ·024	—	—
19	20	**15** ·047	**14** ·020	**13** ·008	**12** ·003
	19	**13** ·039	**12** ·018	**11** ·008	**10** ·003
	18	**11** ·026	**10** ·012	**9** ·005⁻	**9** ·005⁻
	17	**10** ·032	**9** ·015⁻	**8** ·006	**7** ·002
	16	**9** ·036	**8** ·017	**7** ·007	**6** ·003
	15	**8** ·038	**7** ·018	**6** ·008	**5** ·003
	14	**7** ·039	**6** ·018	**5** ·007	**4** ·003
	13	**6** ·038	**5** ·017	**4** ·007	**3** ·002
	12	**5** ·035⁺	**4** ·015⁺	**3** ·005⁺	**2** ·002
	11	**4** ·031	**3** ·012	**2** ·004	**2** ·004
	10	**3** ·026	**2** ·009	**2** ·009	**1** ·002
	9	**2** ·019	**2** ·019	**1** ·005⁺	**0** ·001
	8	**2** ·039	**1** ·012	**0** ·002	**0** ·002
	7	**1** ·026	**0** ·005⁺	**0** ·005⁺	—
	6	**0** ·012	**0** ·012	—	—
	5	**0** ·027	—	—	—
18	20	**14** ·041	**13** ·017	**12** ·007	**11** ·003
	19	**12** ·032	**11** ·014	**10** ·006	**9** ·002
	18	**11** ·043	**10** ·020	**9** ·008	**8** ·003
	17	**10** ·050⁻	**9** ·024	**7** ·004	**7** ·004
	16	**8** ·026	**7** ·011	**6** ·005⁻	**6** ·005⁻
A = 20 B = 18	15	**7** ·027	**6** ·012	**5** ·004	**5** ·004
	14	**6** ·026	**5** ·011	**4** ·004	**4** ·004
	13	**5** ·024	**5** ·024	**4** ·009	**3** ·003
	12	**5** ·047	**4** ·020	**3** ·007	**2** ·002
	11	**4** ·041	**3** ·016	**2** ·005⁺	**1** ·001
	10	**3** ·033	**2** ·012	**1** ·003	**1** ·003
	9	**2** ·024	**2** ·024	**1** ·007	**0** ·001
	8	**2** ·048	**1** ·015⁻	**0** ·003	**0** ·003
	7	**1** ·031	**0** ·006	**0** ·006	—
	6	**0** ·014	**0** ·014	—	—
	5	**0** ·031	—	—	—
17	20	**13** ·036	**12** ·014	**11** ·005⁺	**10** ·002
	19	**11** ·026	**10** ·011	**9** ·004	**9** ·004
	18	**10** ·034	**9** ·015⁻	**8** ·006	**7** ·002
	17	**9** ·038	**8** ·017	**7** ·007	**6** ·003
	16	**8** ·040	**7** ·018	**6** ·007	**5** ·003
	15	**7** ·039	**6** ·017	**5** ·007	**4** ·002
	14	**6** ·037	**5** ·016	**4** ·006	**3** ·002
	13	**5** ·033	**4** ·013	**3** ·005⁻	**3** ·005⁻
	12	**4** ·028	**3** ·010⁺	**2** ·003	**2** ·003
	11	**3** ·022	**3** ·022	**2** ·007	**1** ·002
	10	**3** ·042	**2** ·015⁺	**1** ·004	**1** ·004
	9	**2** ·031	**1** ·009	**1** ·009	**0** ·001
	8	**1** ·019	**1** ·019	**0** ·003	**0** ·003
	7	**1** ·037	**0** ·008	**0** ·008	—
	6	**0** ·017	**0** ·017	—	—
	5	**0** ·036	—	—	—
16	20	**12** ·031	**11** ·012	**10** ·004	**10** ·004
	19	**11** ·049	**10** ·021	**9** ·008	**8** ·003
	18	**9** ·026	**8** ·011	**7** ·004	**7** ·004
	17	**8** ·028	**7** ·012	**6** ·004	**6** ·004
	16	**7** ·028	**6** ·012	**5** ·004	**5** ·004
	15	**6** ·026	**5** ·011	**4** ·004	**4** ·004
	14	**5** ·023	**5** ·023	**4** ·009	**3** ·003
	13	**5** ·046	**4** ·019	**3** ·007	**2** ·002
	12	**4** ·038	**3** ·014	**2** ·004	**2** ·004
	11	**3** ·029	**2** ·010⁻	**2** ·010⁻	**1** ·002
	10	**2** ·020	**2** ·020	**1** ·005⁺	**0** ·001
	9	**2** ·039	**1** ·011	**0** ·002	**0** ·002
	8	**1** ·023	**1** ·023	**0** ·004	**0** ·004
	7	**1** ·045⁺	**0** ·009	**0** ·009	—
	6	**0** ·020	**0** ·020	—	—
	5	**0** ·041	—	—	—

The table shows:

(1) In bold type, for given A, B and a, the value of b ($<a$) which is just significant at the probability leve quoted (single-tail test).

(2) In small type, for given A, B and $r=a+b$, the exact probability (if there is independence) that b is equal tc or less than the integer shown in bold type.

Significance tests in a 2 × 2 contingency table (continued)

	a	Probability			
		0·05	0·025	0·01	0·005
A = 20 B = 15	20	11 ·026	10 ·009	10 ·009	9 ·003
	19	10 ·040	9 ·016	8 ·006	7 ·002
	18	9 ·046	8 ·019	7 ·007	6 ·002
	17	8 ·047	7 ·020	6 ·008	5 ·002
	16	7 ·045⁻	6 ·019	5 ·007	4 ·002
	15	6 ·040	5 ·017	4 ·006	3 ·002
	14	5 ·034	4 ·013	3 ·004	3 ·004
	13	4 ·028	3 ·010⁻	3 ·010⁻	2 ·003
	12	3 ·020	3 ·020	2 ·006	1 ·001
	11	3 ·039	2 ·013	1 ·003	1 ·003
	10	2 ·026	1 ·007	1 ·007	0 ·001
	9	2 ·049	1 ·015⁻	0 ·002	0 ·002
	8	1 ·029	0 ·005⁺	0 ·005⁺	—
	7	0 ·012	0 ·012	—	—
	6	0 ·024	0 ·024	—	—
	5	0 ·048	—	—	—
14	20	10 ·022	10 ·022	9 ·007	8 ·002
	19	9 ·032	8 ·012	7 ·004	7 ·004
	18	8 ·035⁺	7 ·014	6 ·005⁻	6 ·005⁻
	17	7 ·035⁻	6 ·013	5 ·005⁻	5 ·005⁻
	16	6 ·031	5 ·012	4 ·004	4 ·004
	15	5 ·026	4 ·009	4 ·009	3 ·003
	14	4 ·020	4 ·020	3 ·007	2 ·002
	13	4 ·040	3 ·015⁻	2 ·004	2 ·004
	12	3 ·029	2 ·009	2 ·009	1 ·002
	11	2 ·018	2 ·018	1 ·005⁻	1 ·005⁻
	10	2 ·035⁺	1 ·010⁻	1 ·010⁻	0 ·001
	9	1 ·019	1 ·019	0 ·003	0 ·003
	8	1 ·037	0 ·007	0 ·007	—
	7	0 ·014	0 ·014	—	—
	6	0 ·029	—	—	—
13	20	9 ·017	9 ·017	8 ·005⁺	7 ·002
	19	8 ·025⁻	8 ·025⁻	7 ·008	6 ·003
	18	7 ·026	6 ·009	6 ·009	5 ·003
	17	6 ·024	6 ·024	5 ·008	4 ·002
	16	5 ·020	5 ·020	4 ·007	3 ·002
	15	5 ·041	4 ·015⁺	3 ·005⁻	3 ·005⁻
	14	4 ·031	3 ·011	2 ·003	2 ·003
	13	3 ·022	3 ·022	2 ·006	1 ·001
	12	3 ·041	2 ·013	1 ·003	1 ·003
	11	2 ·026	1 ·007	1 ·007	0 ·001
	10	2 ·047	1 ·013	0 ·002	0 ·002
	9	1 ·026	0 ·004	0 ·004	0 ·004
	8	1 ·047	0 ·009	0 ·009	—
	7	0 ·018	0 ·018	—	—
	6	0 ·035⁻	—	—	—
12	20	9 ·044	8 ·014	7 ·004	7 ·004
	19	7 ·019	7 ·019	6 ·006	5 ·002

	a	Probability			
		0·05	0·025	0·01	0·005
A = 20 B = 12	18	6 ·018	6 ·018	5 ·006	4 ·002
	17	6 ·043	5 ·016	4 ·005⁻	4 ·005⁻
	16	5 ·034	4 ·012	3 ·003	3 ·003
	15	4 ·025⁺	3 ·008	3 ·008	2 ·002
	14	4 ·049	3 ·017	2 ·005⁻	2 ·005⁻
	13	3 ·033	2 ·010⁻	2 ·010⁻	1 ·002
	12	2 ·020	2 ·020	1 ·005⁻	1 ·005⁻
	11	2 ·036	1 ·009	1 ·009	0 ·001
	10	1 ·018	1 ·018	0 ·003	0 ·003
	9	1 ·034	0 ·006	0 ·006	—
	8	0 ·012	0 ·012	—	—
	7	0 ·023	0 ·023	—	—
	6	0 ·043	—	—	—
11	20	8 ·037	7 ·010⁺	6 ·003	6 ·003
	19	7 ·042	6 ·013	5 ·004	5 ·004
	18	6 ·037	5 ·012	4 ·003	4 ·003
	17	5 ·029	4 ·009	4 ·009	3 ·002
	16	4 ·021	4 ·021	3 ·006	2 ·001
	15	4 ·042	3 ·014	2 ·003	2 ·003
	14	3 ·028	2 ·008	2 ·008	1 ·001
	13	2 ·016	2 ·016	1 ·003	1 ·003
	12	2 ·029	1 ·007	1 ·007	0 ·001
	11	1 ·014	1 ·014	0 ·002	0 ·002
	10	1 ·026	0 ·004	0 ·004	0 ·004
	9	1 ·046	0 ·008	0 ·008	—
	8	0 ·016	0 ·016	—	—
	7	0 ·029	—	—	—
10	20	7 ·030	6 ·008	6 ·008	5 ·002
	19	6 ·031	5 ·009	5 ·009	4 ·002
	18	5 ·026	4 ·007	4 ·007	3 ·002
	17	4 ·018	4 ·018	3 ·005⁻	3 ·005⁻
	16	4 ·039	3 ·012	2 ·003	2 ·003
	15	3 ·024	3 ·024	2 ·006	1 ·001
	14	3 ·045⁺	2 ·013	1 ·003	1 ·003
	13	2 ·025⁺	1 ·006	1 ·006	0 ·001
	12	2 ·045⁻	1 ·011	0 ·001	0 ·001
	11	1 ·021	1 ·021	0 ·003	0 ·003
	10	1 ·037	0 ·006	0 ·006	—
	9	0 ·012	0 ·012	—	—
	8	0 ·022	0 ·022	—	—
	7	0 ·038	—	—	—
9	20	6 ·023	6 ·023	5 ·005⁺	4 ·001
	19	5 ·022	5 ·022	4 ·005⁺	3 ·001
	18	4 ·016	4 ·016	3 ·004	3 ·004
	17	4 ·037	3 ·010⁺	2 ·002	2 ·002
	16	3 ·022	3 ·022	2 ·005⁺	1 ·001
	15	3 ·043	2 ·012	1 ·002	1 ·002
	14	2 ·023	2 ·023	1 ·005⁻	1 ·005⁻

Significance tests in a 2 × 2 contingency table (continued)

	a	Probability					a	Probability			
		0·05	0·025	0·01	0·005			0·05	0·025	0·01	0·005
A=20 B=9	13	**2** ·041	**1** ·009	**1** ·009	**0** ·001	A=20 B=6	14	**1** ·032	**0** ·004	**0** ·004	**0** ·004
	12	**1** ·018	**1** ·018	**0** ·002	**0** ·002		13	**0** ·007	**0** ·007	**0** ·007	—
	11	**1** ·032	**0** ·005⁻	**0** ·005⁻	**0** ·005⁻		12	**0** ·013	**0** ·013	—	—
	10	**0** ·009	**0** ·009	**0** ·009	—		11	**0** ·022	**0** ·022	—	—
	9	**0** ·017	**0** ·017	—	—		10	**0** ·035⁻	—	—	—
	8	**0** ·029	—	—	—						
	7	**0** ·050⁻	—	—	—		5	20	**3** ·033	**2** ·004	**2** ·004	**2** ·004
								19	**2** ·016	**2** ·016	**1** ·002	**1** ·002
	8	20	**5** ·017	**5** ·017	**4** ·003	**4** ·003		18	**2** ·038	**1** ·005⁺	**1** ·005⁺	**0** ·000
		19	**4** ·015⁻	**4** ·015⁻	**3** ·003	**3** ·003		17	**1** ·012	**1** ·012	**0** ·001	**0** ·001
		18	**4** ·038	**3** ·009	**3** ·009	**2** ·002		16	**1** ·023	**1** ·023	**0** ·002	**0** ·002
		17	**3** ·022	**3** ·022	**2** ·005⁻	**2** ·005⁻		15	**1** ·040	**0** ·005⁻	**0** ·005⁻	**0** ·005⁻
		16	**3** ·044	**2** ·011	**1** ·002	**1** ·002		14	**0** ·009	**0** ·009	**0** ·009	—
		15	**2** ·022	**2** ·022	**1** ·004	**1** ·004		13	**0** ·015⁻	**0** ·015⁻	—	—
		14	**2** ·040	**1** ·009	**1** ·009	**0** ·001		12	**0** ·024	**0** ·024	—	—
		13	**1** ·016	**1** ·016	**0** ·002	**0** ·002		11	**0** ·038	—	—	—
		12	**1** ·029	**0** ·004	**0** ·004	**0** ·004						
		11	**1** ·048	**0** ·008	**0** ·008	—		4	20	**2** ·022	**2** ·022	**1** ·002	**1** ·002
		10	**0** ·014	**0** ·014	—	—			19	**1** ·008	**1** ·008	**1** ·008	**0** ·000
		9	**0** ·024	**0** ·024	—	—			18	**1** ·018	**1** ·018	**0** ·001	**0** ·001
		8	**0** ·041	—	—	—			17	**1** ·035⁺	**0** ·003	**0** ·003	**0** ·003
									16	**0** ·007	**0** ·007	**0** ·007	—
	7	20	**4** ·012	**4** ·012	**3** ·002	**3** ·002			15	**0** ·012	**0** ·012	—	—
		19	**4** ·042	**3** ·009	**3** ·009	**2** ·001			14	**0** ·020	**0** ·020	—	—
		18	**3** ·024	**3** ·024	**2** ·005⁻	**2** ·005⁻			13	**0** ·031	—	—	—
		17	**3** ·050⁻	**2** ·011	**1** ·002	**1** ·002			12	**0** ·047	—	—	—
		16	**2** ·023	**2** ·023	**1** ·004	**1** ·004							
		15	**2** ·043	**1** ·009	**1** ·009	**0** ·001		3	20	**1** ·012	**1** ·012	**0** ·001	**0** ·001
		14	**1** ·016	**1** ·016	**0** ·002	**0** ·002			19	**1** ·034	**0** ·002	**0** ·002	**0** ·002
		13	**1** ·029	**0** ·004	**0** ·004	**0** ·004			18	**0** ·006	**0** ·006	**0** ·006	—
		12	**1** ·048	**0** ·007	**0** ·007	—			17	**0** ·011	**0** ·011	—	—
		11	**0** ·013	**0** ·013	—	—			16	**0** ·020	**0** ·020	—	—
		10	**0** ·022	**0** ·022	—	—			15	**0** ·032	—	—	—
		9	**0** ·036	—	—	—			14	**0** ·047	—	—	—
	6	20	**4** ·046	**3** ·008	**3** ·008	**2** ·001		2	20	**0** ·004	**0** ·004	**0** ·004	**0** ·004
		19	**3** ·028	**2** ·005⁻	**2** ·005⁻	**2** ·005⁻			19	**0** ·013	**0** ·013	—	—
		18	**2** ·013	**2** ·013	**1** ·002	**1** ·002			18	**0** ·026	—	—	—
		17	**2** ·028	**1** ·004	**1** ·004	**1** ·004			17	**0** ·043	—	—	—
		16	**1** ·010⁻	**1** ·010⁻	**1** ·010⁻	**0** ·001							
		15	**1** ·018	**1** ·018	**0** ·002	**0** ·002		1	20	**0** ·048	—	—	—

The table shows:

(1) In bold type, for given A, B and a, the value of b ($<a$) which is just significant at the probability level quoted (single-tail test).

(2) In small type, for given A, B and $r=a+b$, the exact probability (if there is independence) that b is equal to or less than the integer shown in bold type.